The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A suspension system for a vehicle having a body and a plurality of wheel support assemblies, comprising:

(a) a tie structure interposed between the body and the wheel support assemblies;

(b) a first interconnection system for interconnecting the tie structure and the wheel support assemblies;

(c) a second interconnection system for interconnecting the tie structure and the body, wherein:

portions of the second interconnection system defining at least one axis along which the body is pivotal longitudinally and/or laterally relative to the tie structure;

portions of the second interconnection system comprising two pivot arm structures longitudinally spaced apart along the tie structure, each of the pivot arm structures having a base portion and an apex portion, the base portions of the pivot arm structures pivotally connected to the tie structure and the apex portions of the pivot arm structures pivotally acting on adjacent portions of the body; and

(d) a load control system interposed and interconnecting the body with the wheel support assemblies and/or the tie structure, the load control system limiting the movement of the body relative to the wheel support assemblies and/or the tie structure.

2. A suspension system according to Claim 1, wherein the second interconnection system supporting the body relative to the tie structure to allow the body to move longitudinally and/or laterally relative to the tie structure upon an impact force of a sufficient level being applied to the body.

3. A suspension system according to Claim 2, wherein the second interconnection system comprising a slide system along which the body is slideable relative to the tie structure upon a selected level of impact force applied to the body relative to the tie structure.

4. A suspension system according to Claim 3, wherein the slide system comprises a powered subsystem for powering the movement of the body relative to the tie structure.

5. A suspension system according to Claim 3, wherein the slide system is elevationally movable relative to the adjacent portion of the tie structure by swinging movement of the pivot arm structures.

6. The vehicle according to Claim 3, wherein the second interconnection system further comprises a resistor acting on the slideway system to resist relative movement between the body and tie structure.

7. A suspension system according to Claim 1, wherein the at least one axis defined by the second interconnection system being at an elevation above the center of gravity of the vehicle.

8. A suspension system according to Claim 1, further comprising a surface structure carried by the body and/or tie structure, said surface structure comprising a surface over which air flows during vehicle travel to apply a load having a downward component to the body and/or tie structure during vehicle travel.

9. A vehicle comprising:

a body;

a frame for supporting the body; and

a body moving system interposed between the frame and the body, the body moving system having a first subsystem carried by the body and a second subsystem engageable with the first subsystem and carried by the frame, whereby the body is capable of moving relative to the frame in at least one of the directions longitudinally and transversely relative to the frame in response to impact loads imposed on the vehicle.

10. A vehicle according to Claim 9, further comprising at least one occupant seat and a seat moving system positioned between the occupant seat and the body to permit the occupant seat to move relative to the body upon a sufficient impact load being applied to the vehicle.

11. A vehicle according to Claim 10, wherein the seat moving system comprising a slide system positioned between the occupant seat and the body to permit the occupant seat to slide in a controlled manner relative to the body upon a sufficient impact load being applied to the vehicle.

12. A vehicle according to Claim 11, wherein the seat slide system further comprising a sensor system to sense the acceleration or deceleration of the vehicle and upon a threshold level of acceleration or deceleration being sensed, the sensing system causing the seat side system to slide the seat in the direction away from the direction in which the vehicle is accelerating or decelerating.

13. A vehicle according to Claim 9, wherein the body moving system comprising a slideway structure carried by either the body or the frame and a slider structure slidably engageable with the slideway structure and carried by the other of the body or the frame.

14. The vehicle according to Claim 9, wherein the body moving system permits the body from detaching from the frame upon an impact load of sufficient magnitude being applied to the vehicle.

15. A vehicle according to Claim 9, further comprising an actuating system connected between the body and the frame to apply a load to the body upon application of a sufficient impact force on the frame to move the body relative to the frame in a direction away from the location of the impact force applied to the frame.

16. A vehicle according to Claim 15, wherein the actuating system receives a signal relative to the location and magnitude of the impact force applied to the frame, and whereupon the actuating system applies a load to the body in relationship to the signal received by the actuating system.

17. A suspension system according to Claim 9, wherein said body moving system comprising:

a trunion structure carried by either the body or the frame; and

a plurality of sliders slidably engageable with the trunion structure and carried by the other of the body and the frame, thereby to permit the body and frame to move

generally longitudinally of the frame relative to each other and generally laterally of the frame relative to each other.

18. A suspension system according to Claim 17, wherein the sliders are pre-loaded relative to the trunion structure to resist movement of the sliders relative to the trunion structure.

19. A suspension system according to Claim 9, further comprising an actuating system connected between the frame and the body to apply a load to the body upon application of an impact force on the frame to move the body relative to the frame in the direction away from the location that the impact load is applied to the frame.

20. A suspension system according to Claim 19, wherein said vehicle further comprising at least one bumper and the actuating system connected between the frame and the said at least one bumper.

21. A suspension system according to Claim 19, wherein the actuating system receives a signal related to the location and magnitude of the impact force applied to the frame and whereupon the actuating system applies a load to the body in relationship to the signal received by the actuating system.

22. A suspension system according to Claim 21, wherein the actuating system includes a fluid actuator interconnected between the frame and the body.

23. A suspension system according to Claim 19, wherein the frame may continue moving toward the direction that the impact load is applied to the frame while the body moves relative to the frame in a direction away from the location that the impact load is applied to the frame.

24. A suspension system according to Claim 9, wherein the actuating system comprises a linkage system interposed between the body and the frame to force the body to move relative to the frame in a direction away from the location that the impact load is applied to the frame.

25. A suspension system according to Claim 24, wherein the vehicle further comprising at least one bumper assembly, and said linkage system interposed between the at least one bumper assembly and the tie structure.

26. A suspension system according to Claim 9, wherein the frame is longitudinally extendable and contractible.

27. A suspension system according to Claim 26, wherein the frame comprises a forward section, a rearward section and a central connection section, said central connection section being telescopically engageable with the frame forward section and frame rearward section.

28. The suspension system for a vehicle having a body and a plurality of wheel support assemblies, comprising:

a tie structure imposed between the body and the wheel support assemblies;

a first interconnection system for interconnecting the tie structure and the wheel support assemblies;

a second interconnection system for supporting the tie structure and the body, wherein portions of said second interconnection defining at least one axis along which the body's pivotal longitudinally and/or laterally relative to the tie structure;

a load control system interposed and interconnecting the body with the wheel support assemblies and/or tie structure, the load control system limiting the movement of the body relative to the wheel support assemblies and/or the tie structure; and

wherein the tie structure is longitudinally expandable and contractible.

29. A suspension system according to Claim 20, wherein the tie structure composes the forward section, rearward section, and its central connection section. The central connection section being telescopically engageable with the tie structure forward section and a tie structure rearward section.

30. A suspension system for a vehicle having a body and a plurality of wheel support assemblies, comprising:

(a) a tie structure interposed between the body and the wheel support assemblies;

(b) a first interconnection system for interconnecting the tie structure to the wheel support assemblies;

(c) a second interconnection system for interconnecting the tie structure and the body, the second interconnection system comprising a plurality of link structures having a first end portion pivotally connected to the tie structure and a second end portion pivotally connected to the body, said link structures oriented relative to the tie structure to extend toward a common point along a longitudinal axis of the tie structure with at least one other link structure.

31. A suspension system according to Claim 30, wherein the link structures comprise pivot arm assemblies having a base portion and an apex portion, and wherein the apex portions of the pivot arm structures extend toward a common point in relationship to at least one other pivot arm structure.

32. A suspension system according to Claim 30, wherein said first interconnection system comprising a pivot arm assembly interconnecting a corresponding wheel support assembly and an adjacent portion of the tie structure; and further comprising a torsion arm interconnecting and acting between two adjacent pivot arms assembly.

33. The suspension system according to Claim 30, wherein said link structures are adjustable in length.

34. The suspension system according to Claim 30, wherein the second end portions of the link structures are connected to the body at a location above at least one of the roll and pitch centers of the vehicle.

35. The suspension system according to Claim 30, wherein the link structures comprise swing arm assemblies having longitudinally separated arms interconnected by a plurality of longitudinal interconnection members, with the lower ends of the arms pinned to the tie structure and the upper ends of the arms pinned to the body, with the swing arm assemblies on opposite sides to the body sloped towards each other in the upward direction so that lines extending therefrom intersect at the roll center of the vehicle.

36. The suspension system according to Claim 30, further comprising a slide system interposed between the second end portions of the link structures and the body for supporting the body for slideable movement relative to the tie structure.

37. A vehicle comprising:

(a) a body;

(b) a frame for supporting the body;

(c) wheel support assemblies; and

(d) a frame moving system interposed between the frame and the wheel support assemblies, the frame moving system having a first subsystem carried by the frame and a second subsystem engageable with the first subsystem and carried by the wheel support assemblies, whereby the frame and the body are capable of moving relative to the wheel support assemblies in at least one of the longitudinal and transverse directions relative to the length of the frame.

38. The vehicle according to Claim 37, wherein the frame moving system includes slide assemblies disposed between the frame and the wheel support assemblies.

39. A suspension system for a vehicle having a body and wheel support assemblies, the wheel support assemblies being laterally spaced apart from each other relative to the body, comprising:

(a) a tie structure interposed between the body and the wheel support structures;

(b) a first interconnection system interconnecting the tie structure to the wheel support structures;

(c) a second interconnection system pivotally interconnecting the tie structure and the body; and

(d) wherein the first interconnection system comprising:

a pivot arm assembly associated with the wheel support structures, the pivot arm assembly being pivotally pinned to the tie structure to rotate about an axis transversely to the length of the tie structure; and

a spring structure operably interconnected between corresponding laterally spaced apart pivot arm assemblies.

40. The suspension system according to Claim 39, wherein the spring structure comprising a torsion bar operably interconnected between corresponding, laterally spaced apart pivot arm assemblies.

41. A suspension system according to Claim 40, wherein the pivot arm assemblies are carried by adjacent portions of the torsion bar structure.

42. The suspension system according to Claim 39, wherein the second interconnection system pivotally interconnecting with the tie structure on the body at a location on the body above the roll center of the body.

43. A suspension system according to Claim 39, wherein the second interconnection system comprising a pair of nominally diagonally disposed links having first, lower end portions pivotally connected to transversely spaced apart locations on the tie structure and second, upper end portions extending towards each other and pivotally connected to laterally spaced apart locations on the body.

44. A vehicle suspension system according to Claim 43, further comprising:

upright members having lower end portions pivotally connected to laterally spaced apart locations of the tie structure; and

a pair of transverse upper links having their outer end portions pivotally connected to the upright members at selective locations spaced above the tie structure, and having their inward end portions pivotally connected to the body at selected locations spaced above the locations that the diagonal links of the second interconnection systems are connected to the body.

45. A suspension system for a vehicle having a body and wheel support structures located on opposite sides of the body at the front and rear of the body, comprising:

a tie structure interposed between the wheel support structures and the body;

a first interconnection system for interconnecting the wheel support structures and the tie structure;

a second interconnection system for pivotally interconnecting the tie structure and the body to enable the body to pivot relative to the tie structure about a longitudinal roll axis;

wherein the first interconnection system comprising a pivot arm assembly associated with each of the wheel support structures, each pivot arm assembly having a first end portion pivotally pinned to a corresponding wheel support structure and a second end portion connected to an adjacent portion of the tie structure, the second end portion of each pivot arm assembly being movable relative to the tie structure in a direction generally laterally relative to the length of the tie structure, including during cornering of the vehicle.

46. The suspension system according to Claim 45, wherein a biasing load is applied to the pivot arm that must be overcome to permit the tie structure to move relative to the pivot arm.

47. A suspension system for a vehicle having a body and wheel support structures located on opposite sides of the body at the front and rear of the body, comprising:

a tie structure interposed between the wheel support structures and the body;

a first interconnection system for interconnecting the wheel support structures and the tie structure;

a second interconnection system for pivotally interconnecting the tie structure and the body to enable the body to pivot relative to the tie structure about a longitudinal roll axis;

wherein the first interconnection system comprises a pivot arm assembly having a first end portion pivotally pinned to a corresponding wheel support structure and a second end portion connected to an adjacent portion of the tie structure, and further comprising a relatively stiff resistance mechanism to limit the rotation of the pivot arm assembly relative to the tie structure; and

a relatively compliant load control structure carried by the pivot arm assembly and interconnected with the body to control the movement of the body relative to the tie structure.

48. The suspension system according to Claim 47, wherein the resistance mechanism comprises a first linear actuator acting between the tie structure and the pivot arm assembly.

49. The suspension system according to Claim 47, wherein the load control system comprises a crank structure mounted on the body, a push rod pivotally connected to the crank structure and pivotally connected to the pivot arm assembly of the first interconnection system.

50. The suspension system according to Claim 49, further comprising a second linear actuator connected to the crank arm assembly to limit the rotation of the crank arm assembly during vehicle operation.

51. A suspension system for a vehicle having a body and a plurality of wheel assemblies, comprising:

(a) a hub carrier coupled to each wheel assembly;

(b) a tie structure;

(c) a first interconnecting system interconnecting the tie structure and the body

(d) a second interconnection system interconnecting the tie structure to the hub carriers and also interconnecting the body to the hub carriers at an effective elevation above the center of gravity of the vehicle, wherein the second interconnection system is movable in the upright direction to enable the body to move in at least one of the pitch and roll directions relative to the tie structure in the direction opposite to the direction of forces applied to the vehicle during cornering and braking.

52. The vehicle suspension system according to Claim 51, wherein the second interconnection system includes first springs coupled between the second interconnection system and the body and second springs coupled between the second interconnection system and the hub carrier.

53. The vehicle suspension system according to Claim 52, wherein the second springs are stiffer than the first springs.

54. The vehicle suspension system according to Claim 51, wherein the second interconnection system comprising an upright slide structure slidably engageable with the corresponding hub carrier, the slide structure having an upper portion slidably coupled to the body and a lower portion slidably coupled to the tie structure.

55. The vehicle suspension system according to Claim 54, wherein the second interconnection system further comprising a first spring disposed between the body and hub carrier and a second spring disposed between the slide structure and the tie structure.

56. The vehicle suspension system according to Claim 55, wherein the second spring is stiffer than the first spring.

57. The vehicle suspension system according to Claim 55, further comprising the steering system connected to the slide structure to rotate the slider bars and thereby turn the hub carriers relative to the tie structure.

58. The vehicle suspension system according to Claim 51, wherein the tie structure and the hub carrier are an integral structure.

59. The vehicle suspension system according to Claim 58, wherein the second interconnection system comprises a plurality of A-arm structures interconnected between the body and the tie structure, the A-arm structures vertically movable relative to the tie structure.

60. The vehicle suspension system according to Claim 59, wherein the tie structure comprises an upright slide structure slidably engageable with the outboard ends of the A-arm structures.

61. The vehicle suspension system according to Claim 60, wherein the second interconnection system further comprises load controllers interconnected between the A-arm structures and the corresponding wheel hub carriers.

62. The vehicle suspension system according to Claim 54, wherein the first interconnection system interconnects the integral hub carrier tie structure with the body.

63. The suspension system for a vehicle having a body and a plurality of wheel support assemblies, comprising:

(a) a tie structure interposed between the body and the wheel support assemblies;

(b) a first interconnection system for interconnecting the tie structure and the wheel support assemblies; and

(c) a second interconnection system for interconnecting the tie structure and the body, the second interconnection system, comprising:

a plurality of first rollers engaging within first cam ways defined by the tie structure, said first cam ways shaped to allow the first rollers of the sub frame to move in the upright direction as the body moves in one of the pitch and roll directions; and

64. The suspension system according to Claim 63 comprising a second set of rollers located that engage corresponding second cam ways located within the body, the body second cam ways shaped to allow the second rollers to move in the upright direction relative to the body during tilting of the other of the body movement in the pitch and roll directions.

65. The suspension system according to Claim 63, wherein the cam ways of the tie structure are sloped in the upright direction.

66. The vehicle suspension system according to Claim 63, wherein the cam ways of the body are sloped in the upright direction.

67. A suspension system for a vehicle having a body and a plurality of wheel support assemblies, comprising:

(a) a tie structure interposed between the body and the wheel support assemblies;

(b) a first interconnection system for interconnecting the tie structure and the wheel support assemblies;

(c) a second interconnection system for interconnecting the tie structure with the body, wherein:

portions of the second interconnection system defining at least one longitudinal axis along which the body is pivotal relative to the tie structure; and

portions of the second interconnection system coupled to the body above the center of gravity of the vehicle and supporting the body for rolling movement about the longitudinal axis during cornering; and

(d) a load control system interposed and interconnecting the body with the wheel support assemblies, the load control system limiting the movement of the body relative to the wheel support assemblies, said load control system also comprising a control member interconnected between the body and the tie structure at approximately the elevation of the roll center of the vehicle, the control member controlling the relative lateral movement between the body and the tie structure during cornering without generating a significant roll couple which otherwise would tend to impose a significant roll torque on the vehicle.

68. A vehicle according to Claim 67, wherein a load control system comprising torsion bars extending from the body and coupled to upward ends of strut assemblies extending upwardly from the wheel support assemblies.

69. The vehicle according to Claim 68, wherein the second interconnection system comprising a sub-frame structure extending upwardly from the tie structure and pivotally coupled to the body at the roll center of the body.

70. A vehicle according to Claim 67, wherein the load control system comprising leading arms extending from the body and coupled to forward strut assemblies extending upwardly from the wheel support assemblies; and torsion bars extending from the leading arms to a location in a direction laterally of the body.

71. A suspension system for a vehicle having the body and wheel support structures located on opposite sides of the body at the front and rear of the body, comprising:

(a) a tie structure interposed between the wheel support structures and the body;

(b) a first interconnection system for interconnecting the wheel assemblies and tie structure, said first interconnection system comprising a pivot arm

assembly coupled to the wheel support system at one location and at a distal second location coupled to a linear actuator extendible and retractable laterally from the tie structure;

(c) a second interconnection system for pivotally interconnecting the tie structure and the body to enable the body to pivot relative to the tie structure about a longitudinal roll axis; and

(d) a load control system for supporting the body relative to the wheel support assemblies, the load control system operable to support the body relative to the wheel support assemblies and tilt the body about the longitudinal axis during travel of the vehicle, including while cornering.

72. The suspension system of Claim 71, wherein the load control system further comprising sensors to sense the direction, speed, and acceleration of the vehicle and operating the load control means in response to the direction, speed, and acceleration of the vehicle, including causing the body to tilt inwardly into a curve when the vehicle is cornering.

73. The vehicle suspension system according to Claim 72, wherein the load control means comprising a linear actuator may be coupled to the first interconnection system may be operated to laterally shift the tie structure relative to at least one of the body and wheel support assemblies in response to driving conditions, including during cornering.

74. The vehicle suspension system having a body and a plurality of wheel support assemblies, comprising:

(a) a tie structure interposed between the body and the wheel support assemblies;

(b) a first interconnection system for interconnecting the tie structure and the wheel support assemblies, said first interconnection system comprising pivot arms extending outwardly from the tie structure and coupled to the wheel support assemblies, a crank arm extending laterally from the pivot arm at a location distal from the location that the pivot arm is coupled to the wheel support assemblies and an actuator to manipulate the crank arms thereby to raise and lower the tie structure relative to the wheel support assemblies;

(c) a second interconnection system for interconnecting the tie structure and the body, portions of the second interconnection system defining at least one longitudinal axis along which the body is pivotal relative to the tie structure, the second interconnection system comprising lift actuators disposed between the tie structure and the body, said lift actuators operable to raise and lower the adjacent portions of the body relative to the tie structure; and

(d) a coordination system whereby when the tie structure lowers relative to the wheel support assemblies the body is correspondingly raised relative to the tie structure thereby tending to maintain a level orientation of the body relative to the wheel support assemblies.

75. The suspension system according to Claim 74:

wherein the actuators of the first interconnection system comprising fluid actuators;

wherein the lift actuators acting between the tie structure and the body comprising fluid actuators; and

wherein the coordination system interconnecting the tie structure actuators with the lift actuators whereby the retraction of the tie structure lift actuators results in corresponding extension of the first interconnection system lift actuators, and extension of the tie structure actuators results in corresponding retraction of the first interconnecting system lift actuators.

76. A two-wheeled vehicle having a front and rear wheel assembly, comprising:

a tie structure interposed between the front and wheel assemblies;

first interconnection system for interconnecting the tie structure with the front and rear wheel assemblies, said first interconnection system comprising the torsion bar assembly disposed between the front wheel assembly and the adjacent portion of the tie structure and a rear torsion bar assembly disposed between the rear wheel and the adjacent portion of the tie structure;

a body;

a second interconnection system to interconnect a body to tie structure, said second interconnection system comprising link arms extending upwardly from longitudinally spaced apart locations of a tie structure with the upper ends of the

link arms pinned to the body, said link arms disposed towards each other in the upward direction towards an intersection point that serves as a pitch center of the two-wheeled vehicle;

load controllers disposed between the wheel assemblies and the body, said load control means having a spring rate that is lower than the spring rate of the front and rear torsion bar assemblies;

77. The two-wheeled vehicle according to Claim 72, further comprising a drive train, wherein the drive train functions as part of the tie structure.

78. The two-wheeled vehicle according to Claim 72, further comprising a drive train mounted on the tie structure.

79. The two-wheeled vehicle according to Claim 72, comprising a motorcycle having a front fork assembly, wherein the front torsion bar assembly is disposed between the front fork assembly and the adjacent portion of the tie structure.

80. A suspension system for a vehicle having a body and a plurality of wheel assemblies, comprising:

(a) a hub carrier associated with each wheel assembly;

(b) a separate tie structure associated with each hub carrier and located adjacent a corresponding hub carrier;

(c) a first interconnection system interconnecting the tie structure and the body to enable the body to roll about its longitudinal axis during cornering;

(d) a second interconnection system interconnecting the tie structure to the hub carriers to allow controlled vertical movement of the tie structure relative to the hub carrier; and

(e) a load controller coupled between the hub carrier and the body.

81. The vehicle suspension system according to Claim 80, wherein the first interconnection system comprises a plurality of pivot arms coupled between the tie structure and corresponding portions of the body, said pivot arms oriented in a direction corresponding to the roll center of the vehicle.

82. The vehicle suspension system according to Claim 81, wherein the pivot arms of the first interconnection system are vertically spaced apart relative to the tie structure.

83. The vehicle suspension system according to Claim 81, wherein the tie structure comprises an upright structure disposed inwardly adjacent the hub carrier.

84. The vehicle suspension system according to Claim 83, wherein the second interconnection system comprising a plurality of parallel pivot arms extending between the hub carrier and the tie structure upright structure and a relatively stiff second load controller coupled between the hub carrier and the upright structure.

85. A vehicle having a body and a plurality of wheel assemblies, comprising:

an axle interconnecting laterally spaced apart wheel assemblies;

a tie structure engaged with the axle adjacent the wheel assemblies;

a first interconnecting system interconnecting the tie structure and the body, said first interconnection system having an upper connection structure connecting an upper portion of the tie structure with the body and a lower connection structure interconnecting a lower portion of the tie structure with the body; and

a second interconnection system interconnecting the tie structures with the axle, said second interconnection system permitting relative upright movement between the tie structures and axle during acceleration and braking of the vehicle.

86. The vehicle according to Claim 85, wherein the tie structures are slideable in the upright direction relative to the axle, and the second interconnection system resiliently couples the tie structures to the axle while resisting the upright movement of the tie structure relative to the axle.

87. The vehicle according to Claim 85, further comprising a load control system for controlling the relative movement between the first interconnection system and the body.

88. The vehicle according to Claim 87, wherein the load control system comprises a linear actuator to limit the pivoting movement of at least one of the upper

connection structure relative to the body and the lower connection structure relative to the body.